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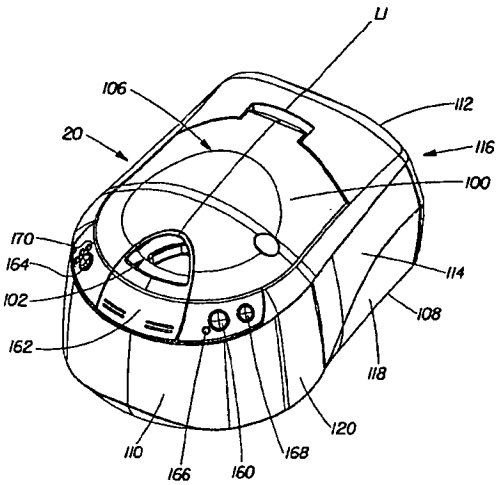
(54) Title: METHOD FOR DISPENSING VOLATILE MATERIALS



(57) Abstract: Articles, systems and methods for dispensing multiple volatile materials into the environment, including but not limited to scents, are disclosed. In one embodiment of the method, a method for scenting a room occupied by a person is provided that includes the steps of: (a) dispersing into the room a first scent element for a play period, the play period being long enough for the person to comprehend an aroma while not exceeding an interval of time in which the person would become desensitized to the aroma; (b) dispersing into the room a second scent element for the play period after completing the play period associated with the first scent element, the second scent element being different than the first scent element; and (c) dispersing into the room a third scent element for the play period after completing the play period associated with the second scent element, the third scent element being different than both of the first and second scent elements.

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METHODS FOR DISPENSING VOLATILE MATERIALS

FIELD OF THE INVENTION

The present invention relates to articles of manufacture, systems, and methods for dispensing volatile materials, including but not limited to scents into the environment, and for providing articles of manufacture containing volatile materials.

BACKGROUND OF THE INVENTION

Devices are currently available for dispensing volatile materials, such as a single scent into a room and in automobiles. Examples of devices for dispensing a single scent into a room include GLADE PLUG INS ® plug in room fresheners manufactured by S.C. Johnson. Devices capable of dispensing scented materials are also described in the patent literature. Examples of such devices are described in: U.S. Patents 4,549,250; 4,714,984, 4,695,434; 4,629,604; and 5,805,768; and in PCT Publication WO 97/02076 and Canadian Patent Application 2,222,838; PCT Publication WO 00/121143; and U.S. Patent Publications 2002/0066798, 2002/0066967, 2002/0068009, and 2002/0068010. The search for improved devices and systems, however, has continued.

SUMMARY OF THE INVENTION

This invention relates to dispensing volatile materials into the environment. In several embodiments, this invention relates to systems or methods, and/or devices or articles for dispensing multiple scents into the environment. Several non-limiting embodiments are described herein, as are several components of the system, each of which may constitute an invention in its own right or together with other components.

In one embodiment, the system for dispensing volatile materials includes an apparatus, such as a dispensing device and an article of manufacture containing one or more volatile

materials for use in conjunction with the dispensing device. In one embodiment, a method for scenting a room occupied by a person is provided that comprises the steps of:

(a) dispersing into the room a first scent element for a play period, said play period being long enough for the person to comprehend an aroma while not exceeding an interval of time in which the person would become desensitized to the aroma;

(b) dispersing into the room a second scent element for said play period after completing said play period associated with said first scent element, said second scent element being different than said first scent element; and

(c) dispersing into the room a third scent element for said play period after completing said play period associated with said second scent element, said third scent element being different than both of said first and second scent elements.

Numerous other embodiments are also possible, including, but not limited to those described in the following detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

While the specification concludes with claims particularly pointing out and distinctly claiming the subject matter which is regarded as forming the present invention, it is believed that the invention will be better understood from the following description taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a perspective view of one embodiment of a device with the cartridge inserted and the top cover in a closed position.

FIG. 2 is an exploded perspective view of the major components of the device shown in FIG. 1.

FIG. 2A is a schematic view of the heating element and spring arrangement of the device showing how the heating element can move in phantom.

FIG. 3 is a perspective view of one embodiment of a cartridge.

FIG. 4 is a top plan view of the cartridge shown in FIG. 3.

FIG. 5 is a bottom plan view of the cartridge shown in FIG. 3.

FIG. 6 is a side view of the cartridge shown in FIG. 3.

FIG. 7 is a rear view of the cartridge shown in FIG. 3.

FIG. 8 is an exploded perspective view showing the components of the cartridge shown in FIG. 3.

FIG. 9 is a plan view of the underside of the shell comprising the upper half of the cartridge.

FIG. 10 is a top view of the cartridge shown in FIG. 3 with a portion of a removable sealing material extending from the rear of the cartridge.

FIG. 11 is a schematic top view showing a first step in applying the removable sealing material to cover the components of the tray of the cartridge.

FIG. 12 is a schematic top view showing a second step of folding back a portion of the removable sealing material that covers the components of the tray of the cartridge.

DETAILED DESCRIPTION OF THE INVENTION

I. Introduction (The Volatile Material Dispensing System and Apparatus).

This invention relates to dispensing volatile materials into the environment. In several embodiments, this invention relates to devices or articles, and/or systems or methods for dispensing multiple scents into the environment. Several non-limiting embodiments are described herein, as are several components of the system, each of which may constitute an invention in its own right or together with other components. The scents or aromas can be supplied to various facilities, which include but are not limited to rooms, houses, hospitals, offices, theaters, buildings, and the like, or into various vehicles such as trains, subways, automobiles, airplanes and the like.

The term "volatile materials" as used herein, refers to a material that is vaporizable. The terms "volatile materials", "aroma", and "scents", as used herein, include, but are not limited to pleasant or savory smells, and, thus, also encompass scents that function as insecticides, air fresheners, deodorants, aromacology, aromatherapy, or any other odor that acts to condition, modify, or otherwise charge the atmosphere or to modify the environment. It should be understood, however, that perfumes, aromatic materials, and scents will often be comprised of one or more volatile materials (which may form a unique and/or discrete unit comprised of a collection of volatile materials).

In one embodiment, the system for dispensing volatile materials comprises one or more components containing one or more scents or aromatic materials. In such an embodiment, the system preferably comprises a dispensing device, such as a device and one or more aromatic material-containing articles of manufacture, or "scent-containing articles of manufacture", which may be provided in the form of fragrance "cartridges". Each cartridge can provide a single

volatile composition, or a combination of different volatile materials, such as a combination of different scented materials. In certain embodiments, each of the cartridges provides a collection of scents that conveys, e.g., a theme, an experience, a physiological effect, and/or a therapeutic effect.

It is known that the perceived intensity of a released fragrance decreases with time from the instant of fragrance emission and therefore repeated release of fragrance can be necessary to maintain a desired fragrance intensity. It is also known that "fragrance fatigue" can occur whereby a person's olfactory organ becomes "saturated" with a particular smell or fragrance and thus the individual becomes insensitive to the presence of the particular fragrance. In certain embodiments, the system and apparatus are especially useful for overcoming this fragrance fatigue that occurs with prior devices that are only capable of emitting a single scent, as well as addressing drawbacks with prior devices capable of emitted multiple scents. It should be understood, however, that the present invention is not limited to devices that are capable of emitting multiple scents, since various aspects of the invention are believed to be novel even when used on devices capable of emitting a single scent, or other type of volatile composition.

FIGS. 1 and 3 show one non-limiting embodiment of the system of the components for dispensing volatile materials into the environment. The system shown in these figures comprises an apparatus (or "diffuser", "dispensing device", or simply "device") 20 and a replaceable multiple compartment volatile composition-containing article of manufacture, such as cartridge 22. The drawings show one non-limiting example of the device and the volatile composition-containing article of manufacture. The control buttons for the device are described in greater detail below. The system of the present invention (that is, the device and cartridge) can be provided in many other suitable configurations.

II. The Volatile Composition-Containing Article of Manufacture.

FIG. 3 shows one non-limiting embodiment of the volatile composition-containing article of manufacture in the form of cartridge 22 as it appears when it is removed from the device 20. The cartridge 22 can contain a single volatile composition, such as a scented material, or multiple volatile compositions (e.g., multiple scented materials and/or other types of volatile compositions). The cartridge 22 has a longitudinal centerline L, and a transverse centerline T.

The cartridge 22 comprises a housing portion (or shell) 24, which has a top surface 26, a bottom surface 28, a front end 30, a rear end 32, and sides 34. The cartridge 22 can be of any

suitable configuration. In other embodiments, the article of manufacture can have a configuration which is: disc-shaped, oval, parallelpiped-shaped, rectangular, cube-shaped, cuboid-shaped, cylindrical-shaped, pyramid-shaped, spherical-shaped, irregularly-shaped, or which has some other configuration.

In other embodiments, the volatile compositions may be contained in or on an article that does not resemble the cartridge shown in the drawings. The term "cartridge" as used herein, is not limited to articles that are in the form of cases or cassettes. For example, the volatile compositions could be provided in or on an article that resembles a disk, such as a compact disk (CD), rather than the device shown in the drawings. In addition, it should be understood that whenever the term "cartridge" is used herein, this is done merely for the purpose of describing the structure shown in the drawings, and anything that is described relative to the cartridge will also be applicable to other types and configurations of articles of manufacture. It should also be understood that while this particular cartridge is described as containing scented compositions, in other embodiments any of the articles of manufacture described herein can comprise any other types of volatile materials.

In the embodiment shown in the drawings, the cartridge 22 has a disk-like configuration. When viewed from above, the cartridge 22 has a generally circular configuration with a protruding region 35 at the rear end 32 thereof. The cartridge 22 has a front half with a configuration that resembles a half circle when viewed from above. The rear half of the cartridge 22 resembles a half circle with a region 35 protruding from the rear end 32 of the cartridge 22. The sides 34 of the cartridge on the rear half of the cartridge in the protruding region 35 are curved slightly concave inward. This protruding region 35 can be used to stabilize the cartridge 22 from rotation when it is placed into the device 20. The shell 24 of the cartridge 22 comprises an upper portion (or upper half) 36, and a lower portion (or lower half) 38.

The volatile composition-containing article of manufacture, such as cartridge 22, is preferably removable from the device, and closed and sealed (that is, the volatile compositions are sealed) so that the volatile compositions are protected from evaporation when the cartridge 22 is removed from the device 20. The term "sealed", as used herein, refers to any attempt to seal, or otherwise cover the volatile materials in order to reduce evaporation of the same. The term "sealed" is, therefore, not limited to embodiments in which the volatile materials are sealed in such a manner that there is absolutely no evaportion. The term "sealed" includes configurations which provide at least a partial barrier to evaporation, and those which provide substantially

complete barriers to evaporation. In the case of perfume scented volatile materials, in some embodiments, it may be desirable for the volatile composition-containing article of manufacture to permit a volatile material, such as perfume, loss that is less than or equal to about 50% (or retains 50%, or more) of the amount of initial volatile material, by weight, over a three month period. In other embodiments, it may be desirable for the volatile composition-containing article of manufacture to permit a volatile material loss of less than or equal to about 25%, alternatively less than about 20%, of the amount of initial volatile material, by weight, over a similar period. Significantly lower losses are desirable in cases where the perfume compositions include volatile materials with particularly dissimiliar volatilies (e.g., compositions with combinations of very highly volatile materials and materials with low volatilities that combine to provide the desired fragrance). In these cases, a significant character shift can occur even with losses of about 5%.

The volatile composition-containing article of manufacture, such as cartridge 22, can in certain embodiments, be disposable after it is "played". In other embodiments, however, it may be desirable for the volatile composition-containing article of manufacture, such as cartridge 22, to be reusable and replayable after it has been initially "played" and removed from the device, and is then inserted back into or onto the device.

The volatile composition-containing article of manufacture, such as cartridge 22, can as shown in the drawings, comprise a closed structure comprising a cover which has at least one opening 52 therein. Preferably, the at least one opening 52 is configured for the emission of a volatile composition from one of the compartments at a given time. Thus, in one embodiment, the cover, shell 24, has a single opening region therein for the emission of one of the scents. In the embodiment shown in the drawings, the cartridge 22 comprises a single opening region 52 with four openings 52A, 52B, 52C, and 52D, separated by members 54 in a region that is configured for the emission of a single composition. The smaller openings 52A, 52B, 52C, and 52D, can be used to prevent user's from touching the exposed volatile compositions. The cartridge 22 can have any number of such openings. However, providing a single opening region is believed to provide the cartridge 22 with less likelihood of the possibility of evaporation of the volatile compositions contained therein than structures which contain multiple doors or covers, each of which are subject to being opened partially or completely, resulting in evaporation of the volatile compositions. It also provides the cartridge 22 with greater protection against tampering. Thus, in the embodiment shown in the drawings, the volatile compositions are enclosed when the volatile composition-containing article of manufacture is removed from the device, and the

volatile compositions are not accessible from outside the article, such as by the opening of doors covering the volatile compositions.

The volatile composition-containing article of manufacture, such as cartridge 22, preferably also has one or more sealing mechanisms that seal the volatile compositions from evaporation. The sealing mechanisms can be internal of the outer shell, or external of the outer shell of the article of manufacture. The cartridge 22 can have a removable shipping seal for preventing the volatile compositions from evaporating before first use of the cartridge. In the embodiment shown in the drawings, the cartridge 22 also comprises a sealing mechanism that seals the volatile compositions that are not intended to emit volatile compositions when the article is inserted into or placed on the device and volatile compositions are being emitted from the volatile compositions in one of the receptacles. It also is capable of sealing all the volatile composition receptacles when the article is removed from the device. In the embodiment shown in the drawings, this sealing mechanism can have a sealed position and an opened position, and is of the internal type, residing inside the cartridge shell. The volatile composition-containing receptacles are preferably closed with a single sealing mechanism. This single sealing mechanism preferably has only one element thereof that is moved in order to seal all of the receptacles. This can be contrasted with articles that have multiple doors for access to each scent, which have numerous elements that must be closed in order to seal all the volatile compositions. This makes the article of manufacture more simple and less expensive to manufacture, and may also improve reliability. Of course, in other embodiments, the article of manufacture could be provided with a sealing mechanism that has multiple components, or undergoes movement of more than one element in order to perform its sealing function.

The volatile composition-containing article of manufacture, such as cartridge 22, preferably also comprises a locking mechanism which is capable of locking and unlocking the article of manufacture. The locking mechanism preferably prevents access to the volatile compositions when the cartridge 22 is removed from the device for safety purposes. The locking mechanism preferably cooperates with the sealing mechanism. The sealing mechanism has a first sealed position and a second opened position. In the embodiment shown in the drawings, the article of manufacture preferably cannot be removed from the device until the sealing mechanism is in its first sealed position. The article of manufacture preferably also comprises a "blank" section which does not have any volatile compositions provided thereon or therein. The "blank" section provides a start and stop position for emitting volatile compositions from the article of manufacture.

FIG. 8 shows the construction of this embodiment of the cartridge 22 in greater detail. In this regard, however, it should be understood that the cartridge 22 shown in FIG. 8 is but one possible embodiment of the article of manufacture. Other types of volatile composition-containing articles can be provided which may not have some or all of the features of the cartridge 22 shown in FIG. 8. The cartridge 22 shown in FIG. 8 comprises several basic components. These include, from top to bottom: the upper part of the cartridge shell 36; a circular rotatable disk or tray 46; and the lower part of the cartridge shell 38. The rotatable tray 46 will be discussed first since, in this embodiment, the other components of the cartridge 22 are designed to cooperate with various features of the tray 46.

The cartridge 22, in one version of this embodiment, contains multiple volatile compositions (or scents, aromatic materials, fragrances, or perfumes) 42 that are disposed on (and/or preferably integrated into) a multiple volatile composition-containing component. Preferably, the multiple volatile compositions are disposed on or in the multiple volatile composition-containing component to form an integral structure. The multiple volatile composition-containing component can be provided in any suitable configuration, and may have any suitable shape. In the embodiment shown in the drawings, the multiple volatile composition-containing component is a circular rotatable tray 46, and the volatile compositions are disposed in receptacles or holders, such as depressions, reservoirs, or pockets 44 formed in the rotatable tray 46.

This tray 46 is contained inside the shell of the cartridge 24 between the upper portion 36 and lower portion 38 thereof. The tray 46 has a top surface 48 and a bottom surface 50. The top surface 48 of the tray 46 has the pockets 44 formed therein. Any suitable number of pockets 44 can be provided, and the pockets 44 can be in any suitable shape. In the embodiment shown in the drawings, there are five pockets 44, and a blank space 51 between two of the pockets 44 for when the cartridge 22 is not intended to emit scents.

The pockets 44 for the volatile compositions in the embodiment shown in the drawings, provide one opening, a top opening, for contact with and emission into the air flowing over the top opening. This is in contrast to structures in which the airstream into which the scents are emitted passes through the volatile composition-containing compartments. Of course, other embodiments could be provided in which the airstream into which the scents are emitted passes through the receptacles. Other embodiments can also be provided where the opening for emission of the scents is located somewhere other than on the top of the pockets 44.

In the embodiment shown in FIG. 8, the tray 46 preferably has a plurality of slots 70 in the perimeter 72 thereof. The slots 70 are located at one edge of the scent pockets 44. On either side of these slots 70, are ramps 74 that gradually increase in depth as the slots 70 are approached. As shown in FIG. 9, in this embodiment of the cartridge 22, the inside surface 90 of the upper portion 36 of the cartridge shell has raised seals 56 for sealing at least some, and preferably all, of the pockets 44 in the tray 46. The raised seals 56 can have any suitable configuration. In the embodiment shown, the raised seals have a configuration similar to that of the perimeter of the pockets 44. The raised seals 56 are sized so that they are larger than the pockets 44.

As shown in Figs. 5 and 8, in this embodiment, the cartridge 22 has three openings in its bottom surface 28 (that is, in the lower portion 38 of the cartridge shell). The openings in the lower portion 38 of the cartridge shell include: an opening in the center 94 to allow a portion of the device to be inserted to turn the rotatable tray 46 inside the cartridge 22; an opening 96 to allow heat from a heating element in the device 20 to transfer to the volatile composition pocket 44 that is exposed for emission; and an opening 98 to allow the device 20 to activate and deactivate a locking system inside the cartridge 22 for sealing the volatile compositions when the cartridge 22 is not in use. In the embodiment shown, the locking mechanism is a cantilever tab 86 extending from the lower portion of the cartridge shell, and is positioned to meet with the slots 70 around the perimeter of the tray 46 to prevent the tray 46 from rotating. The locking mechanism is, thus, integrated into the cartridge shell and/or the tray 46, and no other components are required to lock the cartridge 22. Optional components, such as a metal spring to counteract any creep in the tab 86 may be added if desired, however.

These openings can have any suitable configurations. In the embodiment shown, the opening in the center 94 is circular. In addition, as shown in Fig. 8, the adjacent portion of the cartridge shell forms side walls 58 that extend inward and taper inwardly toward the center of the cartridge 22. These tapered side walls 58 can be used to assist in centering the cartridge 22 on top of the spindle (or hub) 60 of the device when the cartridge 22 is inserted into the device 20. In the embodiment shown, the second opening 96 is also circular. In other embodiments, however, this opening can be configured to mate with the shape of the heating element 142 to further stabilize the cartridge 22 against rotation. In the embodiment shown, the third opening 98 has sides formed of at least some rectilinear segments.

The top surface 26 of the upper portion 36 of the cartridge can have any suitable configuration. The top surface 26 can be flat, convex, or concave. In some embodiments, it may

be desirable for the top surface to be slightly convex or concave, so that when the tray 46 and top surface 26 of the cartridge are pushed together, the top surface 26 of the cartridge 22 will flatten. This arrangement may be used to provide a more uniform and predictable sealing surface than a top surface 26 that is initially flat. In the embodiment shown, where the ramps 74 are located around the periphery of the tray 46, it is desirable for the top surface 26 of the cartridge to be concave. Then as the tray 46 is pushed up when it moves on the ramps 74 to form the seal, the top surface 26 of the cartridge 22 will flatten out and the seals 56 on the underside 90 of the upper cartridge shell 36 will make contact with the area around each pocket on the top surface of the tray 46. In embodiments in which the cam system (i.e., the ramps, etc.) is in the center of the tray 46, it may be desirable for the top surface 26 of the cartridge to be convex.

If the cartridge 22 is used in a device 20 comprising a heater, the tray 46 should comprise a material that will not melt when the volatile material(s) are heated. Any suitable material that that satisfies this requirement can be used in such a situation, including, but not limited to polybutyl terapthalate (or "PBT").

The cartridge 22 may be provided with a number of additional features. For example, in some embodiments, the cartridge 22 may be provided with features that ensure that the tray 46 rotates smoothly about a vertical axis therein (without wobbling, or the like). In some embodiments, the cartridge 22 may be provided with features to ensure that the cartridge 22 remains in a fixed position in the device (without rotating or the like) so that the tray 46 inside the cartridge 22 can rotate properly. In some embodiments, the cartridge 22 (or a component thereof, such as the disk 46) may be provided with various safety features (for example, to ensure that the cartridge 22 is inserted properly into the device).

As shown in Fig. 5, in this embodiment, the bottom surface 50 of the tray 46 has several elements projecting therefrom (in addition to the projections formed by the pockets 44). These are shown projecting through holes 94 and 96 in the bottom surface 28 of the cartridge 22. In the center of the tray 46 is a boss 62 having a circular cross-section. The circular boss 62 has one or more ribs extending therefrom, such as ribs 64 and 66 extending from opposing sides thereof. In the embodiment shown, the ribs 64 and 66 have a generally rectangular configuration. In the embodiment shown, the ribs are configured so that one rib 64 is wider than the other rib 66. These ribs 64 and 66 mate with a channel on the top of the hub 60 of the device 20. The configuration of the ribs 64 and 66 is established so that the cartridge 22 can only be inserted into the device 20 in one orientation. The ribs 64 and 66 can be of any suitable size and shape

provided that they are capable of ensuring this one way fit. In one non-limiting embodiment, the rib 66 on the side near the blank section of the tray 46 is between about 0.05 inches and about 0.1 inches (about 1.3 to about 2.5 mm) thick (that is, its dimension measured parallel to the transverse centerline T, when it is oriented as shown in FIG. 5). The opposite rib 64 is between about 0.06 inches and about 0.125 inches (about 1.5 to about 3.8 mm) thick. Each rib 64 and 66 protrudes from the center boss 62 between about 0.2 inches and about 0.3 inches (about 60 mm to about 90 mm).

At the ends of the ribs 64 and 66, there can be an arcuate rib 76 that is perpendicular to the ribs. In this embodiment, the rib end and arcuate ribs 76 are sized so that they meet with the portions of the cartridge 22 that define the central hole 94 in the bottom 28 of the cartridge 22. This stabilizes the tray 46 with respect to the bottom of the cartridge to ensure that the tray 46 rotates around a fixed axis within the cartridge 22. Additional arcs or locating features can be added to further stabilize the tray 46 with respect to the cartridge. For example, the bottom surface 50 of the tray 46 may also have other projections, such as large arcuate ribs 78 that underlie the blank section 51 to ensure that the tray 46 rotates smoothly even in the area where no pockets 44 are present.

In the embodiment shown, the sealing mechanism comprises cam followers (or posts) which are shown in the form of horizontally-oriented tabs or shelves and cams (or ramps) that engage with each other to cause components of the cartridge to fit closely together form the seal. The posts 92 and the ramps 74 can be located on any suitable components of the article of manufacture. For example, the posts 92 may be located on the shell 24 and the ramps 74 may be located on the perimeter 72 of the tray 46. In the embodiment shown, the posts 92 are located on the inside portion 90 of the upper shell. As the tray 46 is rotated into the position where no volatile composition pocket 44 is exposed, the ramps 74 on the perimeter 72 of the tray 46 engage with the posts 92 on inside 90 of the upper shell 36 forcing the tray 46 toward the top surface of the upper shell 36. As the tray 46 moves closer to the inside 90 of the top surface 26 of the upper shell 36, it first makes contact with the center of the inside 90 of the top surface 26 and continues to push the top surface 26 until it changes to a flat configuration when each of the seals 56 make contact with the inside 90 of the top surface 48 of the tray 46.

The article of manufacture 22 comprises a shipping seal 80. The shipping seal 80 can be used for example, after the article of manufacture is made, while the article of manufacture is in inventory waiting to be shipped and/or during shipping. It may be desirable to use a shipping seal

to provide a tighter seal than can be provided using the cartridge sealing mechanism. Figs. 10-12 show one non-limiting embodiment of a shipping seal 80. As shown in Fig. 11, the shipping seal 80 comprises at least one piece of material that covers one or more of compartments, such as the pockets 44. The shipping seal 80, like many of the other components described herein, is not limited for use on multiple scent articles, on reusable, or replayable articles, and can be used on single composition articles, disposable articles, and single use articles.

The shipping seal 80 can comprise any suitable material, and can be affixed to any part of the article of manufacture in any suitable manner. In one non-limiting embodiment, the shipping seal 80 comprises a peelable film comprised of multiple layers, including, but not limited to an amorphous polyester sealant layer and a metalized polyester barrier layer. In this embodiment, the shipping seal 80 is heat sealed around each of the compartments 44 of the tray 46. Sealing around each of the compartments 44 can be used to prevent cross-contamination between different volatile compositions 42 in the compartments 44, if the compartments 44 contain different materials. The shipping seal 80 is sealed to the tray 46 by a heat seal in which at least a portion of the polyester layer is melted. The shipping seal 80 can be adhesively sealed to the tray 46, but heat sealing may be preferred if the compartments 44 contain perfumes because many adhesives do not work well with many perfume components.

The shipping seal 80 in this embodiment has a first portion, sealing portion 80A, and a second folded portion 80B that is folded back on top of the sealing portion 80A. The folded portion 80B may comprise a tab for grasping by a user. This configuration allows the shipping seal 80 to be peeled from the tray 46 and removed through an opening, such as a slot 82 in the back portion of the cartridge 22 with a single motion. In the preferred embodiment of cartridge 22, the slot 82 for removal of the shipping seal 80 is offset at an angle greater than 0 degrees and less than about 90 degrees from the longitudinal centerline L. This offset reduces the peak pull force for removal of the shipping seal by orienting the direction of peeling such that the surface area of sealed area that is perpendicular to the direction of peeling is reduced, and/or more equalized throughout the duration of the removal of the shipping seal.

Numerous other embodiments of the volatile composition-containing article of manufacture, e.g., cartridge 22, are possible. Some non-limiting examples of other embodiments that are applicable to the volatile composition-containing article of manufacture described herein are discussed in greater detail in several of the priority applications that are incorporated by reference herein. In these or other embodiments, the article of manufacture, such as the cartridge

can be altered so that it has one or more of the following properties: re-usability, refillability, disposability, and recycleability.

The volatile compositions 42 can be provided in any suitable form. In some embodiments, scents are provided by volatile compositions comprising perfume, such as perfume oils, that are incorporated onto or into a suitable carrier. The carriers can be provided in the following non-limiting forms: a solid, a liquid, a paste, a gel, beads, encapsulates, wicks, a carrier material, such as a porous material impregnated with or containing the perfume, and combinations thereof. In some embodiments, the carrier is in the form of a pliable solid which can be melted and have the perfume ingredients added thereto in order to form a composition that is in the form of a pliable solid structure or matrix at room temperature (73°F (25°C), 50% RH).

In certain embodiments, the volatile composition has a viscosity of from about 1,000 Cps to about 1,000,000 Cps, or more, measured at a shear stress of 100 Pa in a rotational rheometer, like the AR2000 (TA instruments New Castle, Delaware, USA), using a 40-mm diameter cone-and-plate geometry at 25 deg C. Such a composition can exist as a gel up to at least about 13,000 Cps. In certain embodiments when the composition is in the form of a pliable solid, it can have a viscosity of from about 100,000 to about 1,000,000 Cps.

In one non-limiting embodiment, at room temperature, the composition is in the form of a structure that is a structured polymeric pliable solid. Such a structure may be porous or non-porous. The structure may be homogeneous (which may also be referred to herein as "continuous"), or non-homogeneous. In many embodiments, it is desirable for the structure to be permeable to volatile materials contained therein. This will allow the structure to release the volatile materials contained therein when desired. In preferred versions of such an embodiment, the composition comprises a non-porous, homogeneous, permeable, structured polymeric pliable solid.

The volatile composition can be formed in a number of different manners. In one embodiment, the composition can be made by adding the volatile ingredient(s) to a carrier, such as polyethylene glycol (or "PEG"). The volatile ingredients, such as perfumes, are preferably miscible with the carrier, and after cooling, forms a pliable solid-like at room temperature. PEG is available in various molecular weights. While PEG's having low molecular weights (or "MW") (e.g., molecular weights less than 400) can be used as solvents for perfumes, such PEG's are liquids at room temperature, and are not preferred for use in the compositions described

herein. In more preferred embodiments of the composition, the MW of PEG is greater than or equal to about 1,000, or greater than or equal to about 4,000. It is desirable that the MW of PEG be greater than or equal to about 8,000. The molecular weight of PEG may be as high as 24,000, or higher. All molecular weights specified herein are weight average molecular weights.

Other suitable carriers are hydrogenated castor oil and high chain fatty acids, particularly those with a chain length of greater than or equal to 14 carbon atoms. In certain embodiments, it is desirable for the majority of the composition to comprise such a carrier and the volatile ingredient(s). Thus, such a carrier and the volatile ingredient(s) may comprise more than about 20%, alternatively, more than about 50% of the composition, by weight. In certain embodiments, it may be desirable for the composition (and/or the carrier) to also be substantially free of HPC (hydroxy propyl cellulose).

It may be desirable to utilize a structurant with the carrier. A structurant can be used for any suitable purpose. Examples of such purposes include, but are not limited to providing the structure formed by the composition with greater stability. The structurant can reduce the tendency of the structure to release the volatile material(s) at low temperatures (e.g., ambient or storage or shipping temperatures). Thus, the volatile material(s) will not be released until energy is applied to the structure in order to release the volatile material(s). Any suitable structurant can be used. Suitable structurants can include any substance that includes a divalent cation. Substances that comprise divalent cations include, but are not limited to magnesium and calcium containing molecules such as magnesium and calcium chloride, and magnesium and calcium carbonate. Other suitable structurants include, but are not limited to derivatives of castor oil, including, but not limited to hydrogenated castor oil.

It may also be desirable for the composition to include at least one wax. Waxes can be used for any suitable purpose, including, but not limited to raising the melting temperature of structure formed by the composition for improved stability. Any suitable wax(es) can be used. In certain embodiments, it is desirable for the wax to have a melting point that is greater than that of the carrier. If the carrier is PEG, the melting point of the wax may, for example, be greater than about 50°C. Suitable waxes include, but are not limited to waxes that are derivatives of the carrier, for example, derivatives of PEG. Waxes that are derivatives of the carrier may be preferred because the structurants that are capable of structuring the carrier will also be able to structure the waxes in order to further raise the melting point of the entire matrix. It may also be

desirable that the wax does not have an affinity for the volatile material so that it does not affect the emission rate or delivery of the volatile material.

In one embodiment, the composition is formed by combining polyethylene glycol (or "PEG"), hydrogenated castor oil, and a low level of at least one wax, and at least one volatile ingredient. The volatile ingredient(s) can comprise a number of components or compositions, including, but not limited to: fragrances (or perfume oils), flavors, pesticides, repellants, or mixtures thereof. The volatile ingredient(s) can be combined with the carrier material in any suitable manner. Several suitable manners in which the volatile ingredient(s) can be combined with the carrier material include, but are not limited to: by entrapment; the volatile ingredient(s) can be dissolved in the carrier material; the volatile ingredient(s) can be partially encapsulated or completely encapsulated in the carrier material.

The components of the composition can be incorporated into the composition in any suitable amounts. In some embodiments, it may be desirable for the concentration of the volatile material(s) to be greater than about 10% of the composition. In some embodiments, the concentration of the volatile material(s), such as the perfume ingredients, may be as high as about 75%, or more of the composition. In other embodiments, the amount of volatile material(s) may range range from about 25% to about 75% of the composition. The carrier (such as polyethylene glycol) may comprise the balance of the composition. In some embodiments, the carrier may range from about 25% to about 75%, or more. In alternative embodiments, the carrier may be present in an amount that is less than this range. The structurant (such as hydrogenated castor oil) level may range from about 0 to about 15%, 20%, 30%, 40%, or more. The wax level may range from about 0 to about 3%, 5%, or more. All percentages stated herein are by weight of the composition, unless stated otherwise. The amounts of the components are typically selected so that they total 100%. However, it is also possible for other components to be added to the composition, in which case the weights of the components such as the carrier, volatile material(s), structurant, and wax may total less than 100% of the composition.

The composition can be made in any suitable manner. In one non-limiting embodiment, the composition is formed by heating the carrier material (such as PEG) until it melts, and adding the volatile material(s) to the molten carrier material, or to a molten mixture of the carrier and other ingredients (such as the structurant and/or waxes). If the carrier is PEG, it will typically melt at about 100°C to about 120°C. Addition of the volatile material(s) will quench the PEG to a lower temperature and form a pliable solid when it cools to room temperature.

The structure (or matrix) comprising the composition can be thermally triggered or otherwise energized to emit the volatile material(s). Such a structure can undergo a transition between a variety of different states depending on the temperature to which the structure is heated. For instance, in some embodiments, the composition can exist in any of the following phases: solid, paste, gel, semi-molten, and liquid, or other states. Each phase of the composition can provide different volatilization characteristics. In the case of scented materials, this can include different volatilization rates, intensities, scent characters, emission profiles, etc. In some embodiments, the change in state of the composition is reversible in that it can change back to, or toward, more solid states. In some embodiments, it may be possible to vary the form or state of the composition from solid-like to gel-like by controlling the proportions of the components of the composition. For example, the composition will become less solid-like and more gel-like with the addition of additional structurant, such as hydrogenated castor oil. The reversible liquefication/gellation/solidification of the structure can be used to regulate/control the release of the volatile material. In most compositions, in the case of fragrance compositions, at lower temperatures, the more highly volatile perfume components (the "top notes") will volatilize first. In the case of certain embodiments of the compositions described herein, if the composition is heated above its melting point (until it becomes a liquid), the perception of the volatile composition will be more true to the desired essence of the character, scent, flavor, etc. of the volatile material since all of the components of the material will be emitted at the same intensity at the desired temperature and time from the highly volatile perfume components (the "top notes") to the less volatile ("bottom notes"). Thus, in certain embodiments, there is minimum partitioning of the different components of the volatile material composition and more consistency of character/concentration over time. In the case of the examples set out herein, the melting point of the matrix is about 52°C. When energy is no longer applied, the structure goes back to a wax-like solid state or pliable solid which reduces the tendency of the volatile material to escape. If the composition is always heated to a melting temperature above that of the carrier, then this will always provide sufficient energy to the composition in order to emit the volatile components therefrom.

In some embodiments, the composition will have a surface tension of higher than 20 dyne/cm and lower than 25 dyne/cm. In some embodiments, the composition will have good stability at elevated temperatures (e.g., up to about 120°F, or 50°C) and/or high humidity (e.g., up to; or greater than or equal to about 80% RH), even at high volatile material concentrations. That is, the composition will not change shape or physical state under such conditions. In certain

embodiments, the composition provides a structure that will not change its physical state (e.g., become more liquid) even when it absorbs water, such as humidity.

The composition may, in some embodiments, also be advantageous in that it may contain relatively high levels of volatile material (e.g., from about 25% to about 75% by weight of the composition). The composition can also incorporate a large number, range, spectrum (or portfolio) of different volatile materials. This is possible due to the ability to alter/adjust the polarity of the carrier to match the polarity of the volatile material by modifying the level of the structurant (e.g., hydrogenated castor oil). For example, in the case of the compositions described herein, the polarity of the volatile material(s) can be in the range of from about 2 to about 5 Debyes, yet the compositions may still be stable under a wide range of storage conditions. This allows combinations of perfumes that are typically not compatible to be incorporated into compositions (for example, vanilla, coffee, cinnamon, which are very polar, can be combined with fruits (e.g., lemon), or other types of perfume ingredients that are at the other end of the polarity spectrum. In addition, the structure of the composition that incorporates the volatile material(s) may be reversible (that is, it can be converted from a more solid state (e.g, a pliable solid) to a more liquid state, and then back to a more solid state). This may provide the composition with handling, storing, and processability benefits.

EXAMPLES

Table 1 provides some non-limiting examples of scented compositions that can be made according to the description herein.

Table 1

Perfume%	PEG%	Hydrogenated Castor Oil %	Wax %
25	75	0	0
50	45	5	0
40	30	30	0
40	40	20	0
40	48	10	2
50	42	5	3
25	0	75	0

The volatile compositions can comprise any suitable perfume. The intensity of the perfume can be evaluated, and the perfume can be diluted if it is found to be too strong. If

desired, the perfume can be diluted with solvents such as dipropylene glycol, triethyl citrate, or other appropriate solvents at varying levels. One non-limiting example of a range within which the perfumes can be diluted is that the perfumes can be diluted to between 0 (i.e., original undiluted perfume concentration) and 50%, by weight.

Preferably, the volatile composition-containing articles of manufacture provide a variety of perfumes with intensities that fall into similar intensity ranges. In other words, in one optional but preferable aspect of the invention, the volatile compositions are "normalized" so that there is an equivalent intensity of scent experience for each composition in the article of manufacture. Methods for normalizing volatile compositions are described in greater detail in the patent applications to which the present application claims priority.

When the volatile compositions comprise scented compositions, the scents in the cartridge 22 may have an overall theme or physiological effect. The term "theme", as used herein, generally refers to scents that are related solely to one or more of the other scents contained in or on the article of manufacture, rather than to scents that are designed to be emitted simultaneously with other media, such as film, music, theatre, art, etc., and relate to such other media. Further, certain aspects of the present invention are also believed to be novel when the scents are emitted simultaneously with the events taking place in some other media. Therefore, the present invention does not exclude the use of scents emitted simultaneously with other media where these aspects of the invention are concerned. In still other embodiments, a number of the scented compositions contained in the cartridge are related to each other, such that they comprise a general type of scent (e.g., floral, etc.) even though the cartridge may not have an overall theme. Any number of the scents may be related in such a manner.

The cartridge 22, or any portion thereof, such as the top surface 26 can have one or more illustrations, colors, icons, and/or writing thereon for various purposes. The cartridge 22 may have an illustration which represents the "theme" of the scents in the cartridge, such as a forest, or floral theme. The cartridge 22 may also have a listing of the scents contained therein and the "track" on which they are found.

III. The Device.

The scent emitting device (or apparatus, diffuser, or simply the "device") 20 can be in any suitable configuration. One embodiment of the device 20 is shown in FIGS. 1 and 2. In the embodiment shown in the drawings, the shape of the device 20 when viewed from above, is

similar to that of the cartridge 22. The device 20 has a top surface 106, a bottom surface 108, a front portion 110, a back or rear portion 112, and sides 114. However, the rear portion of the device 20 extends further than the protrusion 35 on the rear of the cartridge 22. The top of the device has a lid 100 and air discharge outlet 102 thereon. The lid 100 can be transparent so that the user of the device can seen the cartridge 22 inside, and any information thereon.

The device 20 can be configured so that it emits volatile materials, such as scented materials, for an individual's personal use (e.g., the device just emits scents via a tube or the like that is placed in the vicinity of the user's nose), or it can be configured to distribute the volatile materials throughout a particular space, such as a room, or a vehicle, or the like. Preferably, the device 20 is configured to distribute the volatile materials throughout a space.

Numerous other embodiments of the device are possible. It should be understood that the present invention is not limited to devices having the configuration shown in the drawings, and in other embodiments, the configuration of the device can differ greatly from that shown in the drawings.

The device 20 may contain a component for activating the volatile materials from their "resting" state to an activated state. Such a component may include, but is not limited to a component that volatilizes or heats the volatile materials. The dispensing device 20 may also contain a component, such as a fan, for diffusing or transporting the volatile materials into the environment or atmosphere.

FIG. 2 shows the construction of the device 20 shown in FIG. 1. The embodiment of the device 20 shown in FIG. 2 comprises a housing 116 comprising several primary elements including a base 118, a housing body 120, a two piece top cover system (or "cover") which includes the outer lid 100 and an inner lid 101, which can be lifted in unison to receive the cartridge 22, the air discharge outlet 102, a rotating platter 122, and at least one motor (two motors 124 and 126 are included in the embodiment shown in FIG. 2). The device 20 also includes an activating component such as a heater 104 to accelerate diffusion of the volatile materials, and a diffusing component such as a fan 156 to flow forced air through the air discharge outlet over the exposed pocket 44A of volatile materials in the rotatable tray 46. The device 20 may comprise a mechanism for aligning the heating element 142 with one or more of the volatile composition-containing receptacles 44. In one non-limiting embodiment, the mechanism rotates the receptacles 44 within the article of manufacture so as to align at least one

of the receptacles 44 with the heating element 142. In other embodiments, there may be more than one heating element under the receptacles 44. In still other embodiments, the receptacles 44 may remain stationary, and the device 20 may comprise a mechanism for rotating or otherwise moving the heating element 142 to align it with the receptacles 44.

The inner lid 101 has a top side 101A, an underside 101B, an air flow channel 103, and a front portion 105 that defines the lower portion of the air discharge outlet 102. The outer lid 100 of the two piece cover system is present primarily for aesthetic purposes. The device 20 would function equally well with a single component lid.

The platter 122 further comprises a spindle or hub 60 for engaging and rotating the rotatable tray 46 inside the cartridge 22. In addition, there is a slot 128 in the platter 122 that allows the lid 100 to be opened and the cartridge 22 to be ejected when the platter 122 is in its home position (with the blank space 51 on the tray 46 under the opening region 52 of the cartridge). When the platter 122 is not in the home position, the eject mechanism intereferes with the platter 122 to lock the lid 100 in a closed position. Only when this slot 128 is present (home position), can the eject mechanism move to allow the lid 100 to open. This ensures that the cartridge 22 cannot be removed if a volatile composition-containing pocket 44 is exposed. This also prohibits the user from coming in direct contact with the heating element while it is in the energized state.

When the cartridge 22 is placed inside the device 20, and the cover 100 is closed, the underside 101B of the inner lid 101 and the top surface 26 of the cartridge 22 cooperate to form the air flow channel 103 therebetween. That is, the underside 101B of the inner lid 101 forms the upper portion of the air flow channel 103, and the top surface 26 of the cartridge 22 forms the lower portion of the air flow channel.

In this particular embodiment, the air flow channel 103 is flared toward the front portion of the device 20. This can provide the front of the air flow channel 103 with a nozzle structure to assist in diffusing the volatile materials. The front of the air flow channel can be flared any suitable amount from an angle of greater than 0 degrees with the longitudinal centerline, L1, to 90°, or more on each side of the longitudinal centerline, L1. In the embodiment shown, the front of the air flow channel flares outward at an angle of about 45° on each side of the longitudinal centerline L1 thereof. In addition, the lower portion of the air discharge outlet 102 may be sloped, such as to angle upward from a horizontal orientation. This can also be used to assist in

diffusing the volatile materials. The lower portion of the air discharge outlet 102 can form any suitable upward angle greater than 0 degrees up to 30°, or more. In this particular embodiment, the front portion 105 of the inner lid 101 provides the lower portion at the front of the air discharge outlet 102 with a ramp that forms an angle of about 15°.

In this particular embodiment, when the cover is lifted, a recessed area 130 for the cartridge 22 is seen. In the embodiment shown, the recessed area 130 is formed in the top portion of the housing 116. The recessed area 130 can be of any suitable configuration. In some embodiments, such as the one shown in the drawings, it may be desirable for the recessed area 130 to conform to at least a portion of the shape of the cartridge 22 so that the cartridge will be prevented from rotating, or otherwise moving, when the tray 46 inside of the cartridge 22 is rotated by the device 20. In one non-limiting embodiment, the recessed area 46 can have substantially the same shape as the exterior of the cartridge 22.

The device 20 may be provided with various safety features. In the embodiment shown, the device 20 is provided with a safety interlock feature that requires the user to insert the cartridge 22 and shut the lid(s) before the device 20 can be started. In this embodiment, a switch 132, such as a spring-loaded switch, is positioned inside the recessed area 130 on the right side of recessed area to the right of the opening for the hub and the hub 60. The switch 132 is in-line with the power supply on a printed circuit board ("PCB") 134. The safety interlock incorporates an additional spring 136 to the left side of the hub in the recessed area 130 to ensure the device 20 is not activated by the weight of the cartridge 22 alone. Thus, even if the device 20 is in play mode, if the additional spring 136 is released, the switch 132 will immediately shut off the device 20. The additional spring 136 is configured so that a force greater than the weight of the cartridge 22 is required to trigger, or activate the same. The additional spring 136 will only be pushed down and turned on when the lid 100 closes and presses down on the top of the cartridge 22. The spring nature of the interlock switch 132, along with the additional spring 136 may also act as an ejection mechanism to help aid in removal of the cartridge 22 from the device 20.

In the embodiment shown, the platter 122 comprises two arcuate positioning rings 138. The inner positioning ring has five notches 140 representing positions that correspond to the location of the pockets 44 in the tray 46. The outer ring has a single notch 140 that corresponds to the location of the position of the blank space 51 in the tray 46 (the "home position"). The platter 122 is used as a positioning system, which moves the appropriate pocket 44 over the heater 104 and into the forced air flow, while leaving the other pockets 44 in a sealed position. This is

accomplished by incorporating two paper sensors onto the printed circuit board 134 (a sending unit and a receiver that are shaped into the configuration of the letter U, which reads whether it can "see" itself or not), together with the notches 140 in the positioning rings 138 on the platter 122. The sensors use infrared, or similar means, to detect the presence of the notches 140. When the sensors see notches 140 in the inner positioning ring, the platter 122, and thus cartridge tray 46 is in one of the five "play" positions. When the notch 140 in the outer positioning ring is seen, the platter 122 is in the home position. The positioning system is described in greater detail in a patent application entitled "Apparatus for Dispersing Volatile Materials Into the Environment" filed on the same date as the present application by The Holmes Group.

The heater 104 can be any suitable heater that is capable of heating the volatile compositions to the desired temperature. The heater 104 preferably comprises a heating element 142, which is the part of the heater that becomes hot. In the embodiment shown, the heating element 142 comprises a cover 146 that can be made of any suitable material, including aluminum or stainless steel. The heater 104 can be run at any suitable temperature, and for any suitable duration. In other embodiments, the heater 104 can be omitted altogether, in which case the scents will be diffused from their "at rest" or unheated state by the fan 156 or any other component which can aid in the volatilization of the volatile materials, i.e. infrared energy, microwaves or the like.

If a heater is present, the heating element 142 is preferably in proximity to the volatile composition-containing pocket 44A that is exposed for emission. The heating element 142 need not contact the pocket 44A. However, if desired, the heating element 142 may not only be in proximity of the pocket 44A, but may also contact the pocket 44A that is exposed for emission to increase the transfer of heat from the heating element 142 to the volatile composition in the pocket 44A. In the embodiment shown in FIG. 2A, the heating element 142 is configured to be of a "floating" design which allows the heating element 142 to remain in constant contact with the underside of the pocket 44A being heated. This allows heat to be transferred to the volatile composition therein by conduction as opposed to convection. The heating element 142 is positioned on a spring 144 that permits the heating element 142 to move up and down. The connection with the spring 144 may also be configured to allow the heating element 142 to pivot, or tilt from side to side. In the embodiment shown, the center of the heating element 142 remains aligned with a vertical axis, A, but in other embodiments, this can vary.

In this embodiment, the tray 46 inside the cartridge 22 is turned around (rotated) by the hub 60. The channel 68 in the top of the hub 60 engages the ribs 64 and 66 on the underside 50 of the tray 46. The platter 122 is connected to a motor 124 through a series of gears, which comprise a worm gear 148 directly mounted to the motor shaft and a set of gears 150 which then drive the platter 122. The motor 124 rotates the worm gear 148 and the worm gear 148 turns the set of gears 150. The set of gears 150 rotate the platter 122, which turns the tray 46 in the cartridge 22 around.

When the cartridge 22 is outside the device 20, the cartridge 22 will be in a locked position with the blank portion 51 of the rotatable tray 46 in position below the opening 52 in the top portion of the cartridge 22. The rotable tray 46 is locked in the home position via a locking mechanism, such as locking pin 86. This locking pin 86 is part of the lower portion 38 of the cartridge shell. The locking pin 86 fits into a slot 70 on the perimeter 72 of the rotatable tray 46. When the cartridge 22 is placed in the device 20, the locking pin 86 contacts a projection 152 inside the recessed region 130 of the housing of the device. This contact causes the locking pin 86 to be pushed out of the way, allowing the rotatable tray 46 to rotate when it is driven by the hub 60. When the cartridge 22 has been played, and is removed from the device 20, the locking pin 86 prevents the tray 46 from rotating.

In the embodiment shown, the device 20 may have a separate motor 126 for running a fan 156. The motors are wired to the printed circuit board which has the control circuitry, which is linked to the control buttons. The device 20 can be provided with an electrical plug for inserting into an electrical outlet of a structure, vehicle (e.g., automobile cigarette lighter), or the like. Alternatively, the device 20 can be powered with batteries.

The device 20 can have any suitable controls for the user. In some embodiments, the device 20 can have a single control which controls both the activation of the volatile compositions from a resting state to an activated state, and the diffusion of the volatile compositions into the environment. For instance, a single control may control the operation of both the heater 104 and the fan 156. The device 20 can, when it is designed to emit scented volatile compositions, be provided with controls to start and stop the device, to select the scent "volume" or intensity, and to skip one or more volatile compositions in the cartridge. These can include a start and a stop button, which may be separate, but are preferably a single start/stop (or "play") button 160, an eject button or latch 162, a scent intensity control 164, and a "skip" button 168 for skipping ahead to the next scent in sequence. It should be understood that the controls described in the preceding

sentence are merely one embodiment of the possible controls for the device 20. The device 20 need not have all of these controls, and may have other, or different controls. If the consumer does not utilize the "skip" control, or if the device 20 is not provided with such a control, the volatile materials can be emitted in a predetermined sequence. Such a sequence can include, but is not limited to, emitting the volatile materials sequentially in the order they are arranged around the tray 46.

The device 20 may also have one or more displays so that the user will be able to determine the control settings. Several non-limiting examples of displays include: a scent intensity display, a scent "track" number display, and a scent duration display. The displays may be in any known form. In the embodiment shown in the drawings, the displays are in the form of light emitting diode (LED) displays. In the embodiment shown in FIG. 1, the play button 160 has a light 166 to indicate when the device 20 is on, and three lights 170 for indicating whether the intensity setting is low, medium, or high. Additionally, the device in Fig. 1 provides a window in the lid 100 to allow the user to see the track number which is illustrated on the rotatable tray 46 of the scent cartridge 22.

The components of the device 20 can be made out of any suitable material, and can be in any suitable arrangement. Suitable materials include, but are not limited to metals (e.g., aluminum), glass, or plastic. Preferably, the duct work on the device, such as the air flow channel 103, is made of PET because it has minimal tendency to absorb odors and deform when heated. In addition, the discharge outlet, the heating element 142, and the scent receptacle 44A for the scent being emitted are preferably located relatively close to the exterior of the device so as to minimize any tendency for scents to contaminate portions of the device which are "down wind" of the discharge outlet 102.

The device 20 may be provided with various internal controls, and other features. In the embodiment shown, for example, the device 20 is provided with a closed loop temperature control (or feedback) system. The closed loop control system can be constantly measuring and adjusting the temperature of the heating element 142 when the device 20 is turned on. This can be achieved in a variety of different ways. For example, the system can comprise a temperature measuring device and a temperature adjusting device. The temperature measuring device can include, but is not limited to: a thermocouple, a thermister, or a resistance temperature detector (RTD); and, the temperature adjusting device can include, but is not limited to a control circuit. In the embodiment shown, a thermister (or thermocouple) is maintained in direct contact with the

heating element 142. The thermister constantly measures the temperature of the heating element 142, and adjusts the voltage (or average power) so that the desired heating element 142 temperature is maintained. More specifically, the thermistor is an adjustable resistor that changes resistance as the temperature changes. The printed circuit board, in conjunction with the micro-controller which contains the software program, measures this change and adjusts the power to the heating element 142 accordingly to achieve the target temperature. This can allow the temperature of the heating element 142 to be adjusted to compensate for changes in environmental, and other conditions. It also allows the heater 104 to quickly change from one intensity to another. Other control embodiments could also be used. For example, the temperature could be controlled by predetermining the voltage supplied to the heater needed to reach a certain temperature, or the like. Additionally, this thermistor is integrated into the safety of the device, as the device will not rotate to the home position until the heater is below a safe temperature. This, along with the eject lock and the power interlock prevent the user from coming into contact with an energized heating element. Lastly, a one shot fuse is incorporated into the heater assembly to prevent a situation wherein the heater gets out of the safe operating temperature. In this case, the fuse blows and the device is deenergized.

Other novel aspects of the present invention relate to the ways the device may be programmed to emit the scents or aromatic materials. This will be referred to as the "emission program". The emission program comprises one or more emission periods during which the aromatic materials are emitted, and the manner or manners in which the scents are emitted.

In one embodiment, at least one of the aromatic materials is emitted for an emission period of greater than or equal to about 1 minute and less than 120 minutes. In other embodiments, the emission period may be any range of number of minutes that falls within the aforementioned range. Such other ranges include, but are not limited to a range of between about 1 minute and about 90 minutes, inclusive, and a range of between about 1 minute and about 60 minutes, inclusive. In still other, but less preferred embodiments, the aromatic materials may be emitted for an emission period of less than 1 minute, or greater than or equal to 120 minutes. The aromatic materials can be emitted continuously during the emission period, or intermittently. The scent emission program in preferred embodiments is intermittent, and uses a pulsed sequence of scent emissions for each given scent to minimize "habituation", and for other benefits described in

greater detail below. The controls can be set up so that the intermittent emission of the scents can take place with or without the user having control thereof.

In one embodiment, a method for scenting a room occupied by a person is provided that comprises the steps of:

(a) dispersing into the room a first scent element for a play period, said play period being long enough for the person to comprehend an aroma while not exceeding an interval of time in which the person would become desensitized to the aroma;

(b) dispersing into the room a second scent element for said play period after completing said play period associated with said first scent element, said second scent element being different than said first scent element; and

(c) dispersing into the room a third scent element for said play period after completing said play period associated with said second scent element, said third scent element being different than both of said first and second scent elements.

In one version of this embodiment, the play period is from about 15 to about 60 minutes, or alternatively from about 20 to about 40 minutes, or alternatively about 30 minutes. In a version of this embodiment, the dispersing in steps (a) through (c) comprise the substeps of: (i) activating said scent element; and (ii) diffusing said activated scent element into the room. In such a version, the play period can include a first sub-period and a second sub-period; and the substep of activating said scent element is performed only during the first sub-period; and the substep of diffusing the activated scent element into the room is performed during both the first and second sub-periods. In one instance, the play period is from about 15 to 60 minutes and said second sub-period is from about 5 to 10 minutes; or alternatively, the play period is from about 20 to 40 minutes and the second sub-period is from about 5 to 10 minutes; or alternatively, the play period is about 30 minutes and the second sub-period is about 8 minutes. In certain embodiments, the substep of activating the scent element is performed by heating the scent element. In certain embodiments, the substep of diffusing the activated scent element into the room is performed by blowing air over the activated scent element.

The device 20 and article of manufacture, such as cartridge 22, can be provided with various features to ensure that only authorized types of articles of manufacture can be inserted into the device 20. For example, in one embodiment, the device 20 may be configured to only receive articles of manufacture that are less than 4.2 inches (10.7 cm) in width. In the case of articles having a circular plan view shape, such articles should have a radius of less than 2.1 inches (5.3 cm). Regardless of the shape of the article, the article may have at least some region,

such as at least one of the protrusion regions 35, that can further stabilize the article against rotation in the device 20. These stabilizing regions can begin at a distance of between about 0.9 inches (about 2.3 cm) and about 1.1 inches (about 2.8 cm) from the transverse centerline, T, measured in a direction perpendicular to the transverse centerline T. The article should be no more than about 0.5 inch (about 1.3 cm) in thickness at distances of greater than or equal to about 0.85 inch (about 2.2 cm) from the longitudinal centerline, L, of the article. Due to the airflow channel, 103 defined by the inner lid of the device 20, the article may have a greater thickness in a region along the longitudinal centerline, L. This region of greater thickness can be in an area that is centered about the longitudinal centerline, L, and is between about 1.4 inches (about 3.6 cm) and about 1.7 inches (about 4.3 cm) wide. In one embodiment, the region of greater thickness can be up to about 1 inch (about 2.5 cm) thick, or more.

The article should have a central hole in its bottom that has a minimum diameter of about 1/2 inch (about 1.3 cm). The article should have an opening on the bottom for the heating element 142 that is at least about 1 inch (about 2.54 cm), preferably at least about 1.25 inch (about 3.2 cm) in width at some portion of the width of this bottom opening. The article should also have a third opening in its bottom for the projection 152 that unlocks the locking pin. At least a portion of this third opening is located in a region that, when viewing the bottom of the article, is at an angle relative to the transverse centerline T, of the article as measured from the intersection of the longitudinal and transverse centerlines, L and T. (The longitudinal and transverse centerlines, L and T, preferably intersect in a region that contains the circular boss 62 on the underside of the tray 46, or any equivalent element that is midway between elements such as ribs 64 and 66 that engage with the channel 68 in the hub 60 of the device. As shown in Fig. 5, the angle, α, that this third opening makes relative to the transverse centerline T, is between about 45° and about 55°. At least a portion of the third opening is spaced from about 1.8 inches (about 4.6 cm) and about 2 inches (about 5 cm) from the intersection of the longitudinal and transverse centerlines, L and T. At least a portion of this third opening has a width, W, that is at least about 0.05 inches (about 0.13 cm) up to about 0.36 inches (about 0.9 cm), or more and a height, H, of at least equal size, that can range up to 0.5 inch (about 1.3 cm), or more.

The device 20 can also be provided with instructions for the operation thereof. Such instructions include, but are not limited to placement instructions to ensure and enhance the operation of the device. Placement instructions can include, but are not limited to instructions that instruct the user to: place the device in a location that is not at too low, or too high of a level (e.g., not on the floor; between 2 – 4 feet (approx. 1 meter +/- 30 cm) above the floor); place the

device on a hard surface (such as a table or countertop); place the device so that the discharge outlet faces the center of the room, or other area in which the device is placed; and to place the device so that the air flow therefrom will be in the same direction of the natural air flow in the space in which it is placed (e.g., in a two story house, the air flow will typically move toward the stairs going to the second floor). The instructions may also include instructions for setting the intensity based on the size of the room, vehicle, etc. in which the device is placed. The instructions can be provided in any suitable form, e.g., written, audio, and/or video.

The manner in which device may be programmed to emit the volatile materials (the "emission program"), as well as the user input to the same, is discussed in greater detail in several of the applications to which the present application claims priority. The device can also be provided with a non-limiting number of other optional features, if desired. These are also described in several of the prior patent applications.

In addition, numerous other embodiments of the device are possible. For example, it is also contemplated that other embodiments can be made in which the cartridge is located on the outside of the housing of the device during use.

In these or other embodiments, instead of the cartridge having a rotatable disk, the disk could remain stationary and the device can be provided with one or more heating elements (or a plurality of heaters) that lie under, or rotate under the volatile composition-containing receptacles. Of course, in any of the embodiments described herein, the heater could be disposed over, or adjacent to the volatile composition-containing receptacles in other embodiments. Other embodiments are also possible.

The intended mode of operation is for the user to place a cartridge 22 into the device 20 and to close the door and press the play button 160. When the cartridge 22 is outside the device, the cartridge 22 will be in a locked position with the blank portion 51 of the rotatable disk with no scent receptacle therein in position below the opening 52 in the top portion of the cartridge 22. The device 20 will first unlock the rotatable tray 46 inside the cartridge 22 and then will rotate the internal rotatable tray 46 in the cartridge 22 to expose the first pocket 44A containing scent gels. The heating element 142 below the pocket 44A will energize and accelerate the emission of perfume. The fan 156 will then be started, forcing air through the air flow channel 103 and past the exposed pocket 44A containing the volatile composition. This air will then enter the room and diffuse the scent quickly throughout the environment. After a pre-determined interval, the heating

will be stopped and the tray 46 will be rotated to expose the next pocket 44. The heater 104 will then restart and emit the next volatile material.

When the user wants to turn the device 20 off, the play/stop button 160 is pressed and the device 20 first rotates the tray 46 inside the cartridge 22 back to the closed position so none of the pockets 44 are exposed to the outside. After this has been completed, the cover can be opened and the user may remove the cartridge. Thereafter, the cartridge 22 may be re-used at a later time if there is still perfume left inside the pockets.

The disclosure of all patents, patent applications (and any patents which issue thereon, as well as any corresponding published foreign patent applications), and publications mentioned throughout this description are hereby incorporated by reference herein. It is expressly not admitted, however, that any of the documents incorporated by reference herein teach or disclose the present invention.

It should be understood that every maximum numerical limitation given throughout this specification will include every lower numerical limitation, as if such lower numerical limitations were expressly written herein. Every minimum numerical limitation given throughout this specification will include every higher numerical limitation, as if such higher numerical limitations were expressly written herein. Every numerical range given throughout this specification will include every narrower numerical range that falls within such broader numerical range, as if such narrower numerical ranges were all expressly written herein.

While particular embodiments of the subject invention have been described, it will be obvious to those skilled in the art that various changes and modifications of the subject invention can be made without departing from the spirit and scope of the invention. In addition, while the present invention has been described in connection with certain specific embodiments thereof, it is to be understood that this is by way of illustration and not by way of limitation and the scope of the invention is defined by the appended claims which should be construed as broadly as the prior art will permit.

CLAIMS

1. A method for scenting a room occupied by a person, said method comprising the steps of:

(a) dispersing into the room a first scent element for a play period, said play period being long enough for the person to comprehend an aroma while not exceeding an interval of time in which the person would become desensitized to the aroma;

(b) dispersing into the room a second scent element for said play period after completing said play period associated with said first scent element, said second scent element being different than said first scent element; and

(c) dispersing into the room a third scent element for said play period after completing said play period associated with said second scent element, said third scent element being different than both of said first and second scent elements.

2. A method for scenting a room as defined by Claim 1, wherein said play period is from about 15 to 60 minutes.

3. A method for scenting a room as defined by Claim 1, wherein said play period is from about 20 to 40 minutes.

4. A method for scenting a room as defined by Claim 1, wherein said play period is about 30 minutes.

5. A method for scenting a room as defined by Claim 1, wherein said dispersing in steps (a) through (c) comprises the substeps of:

(i) activating said scent element; and

(ii) diffusing said activated scent element into the room.

6. A method for scenting a room as defined by Claim 5, wherein said play period includes a first sub-period and a second sub-period;

said substep of activating said scent element is performed only during said first sub-period; and

said substep of diffusing said activated scent element into the room is performed during both said first and second sub-periods.

7. A method for scenting a room as defined by Claim 6, wherein said play period is from about 15 to 60 minutes and said second sub-period is from about 5 to 10 minutes.

8. A method for scenting a room as defined by Claim 6, wherein said play period is from about 20 to 40 minutes and said second sub-period is from about 5 to 10 minutes.

9. A method for scenting a room as defined by Claim 6, wherein said play period is about 30 minutes and said second sub-period is about 8 minutes.

10. A method for scenting a room as defined by Claim 5, wherein said substep of activating said scent element is performed by heating said scent element.

11. A method for scenting a room as defined by Claim 5, wherein said substep of diffusing said activated scent element into the room is performed by blowing air over said activated scent element.

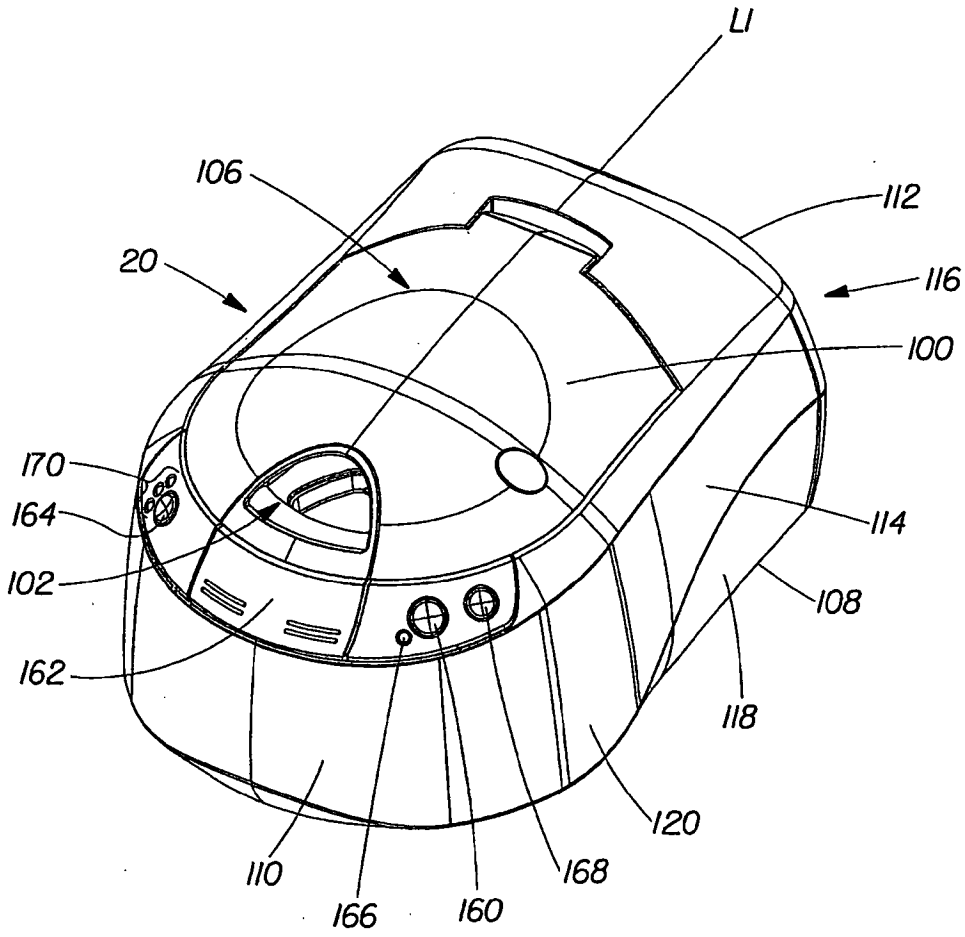

Fig. 1

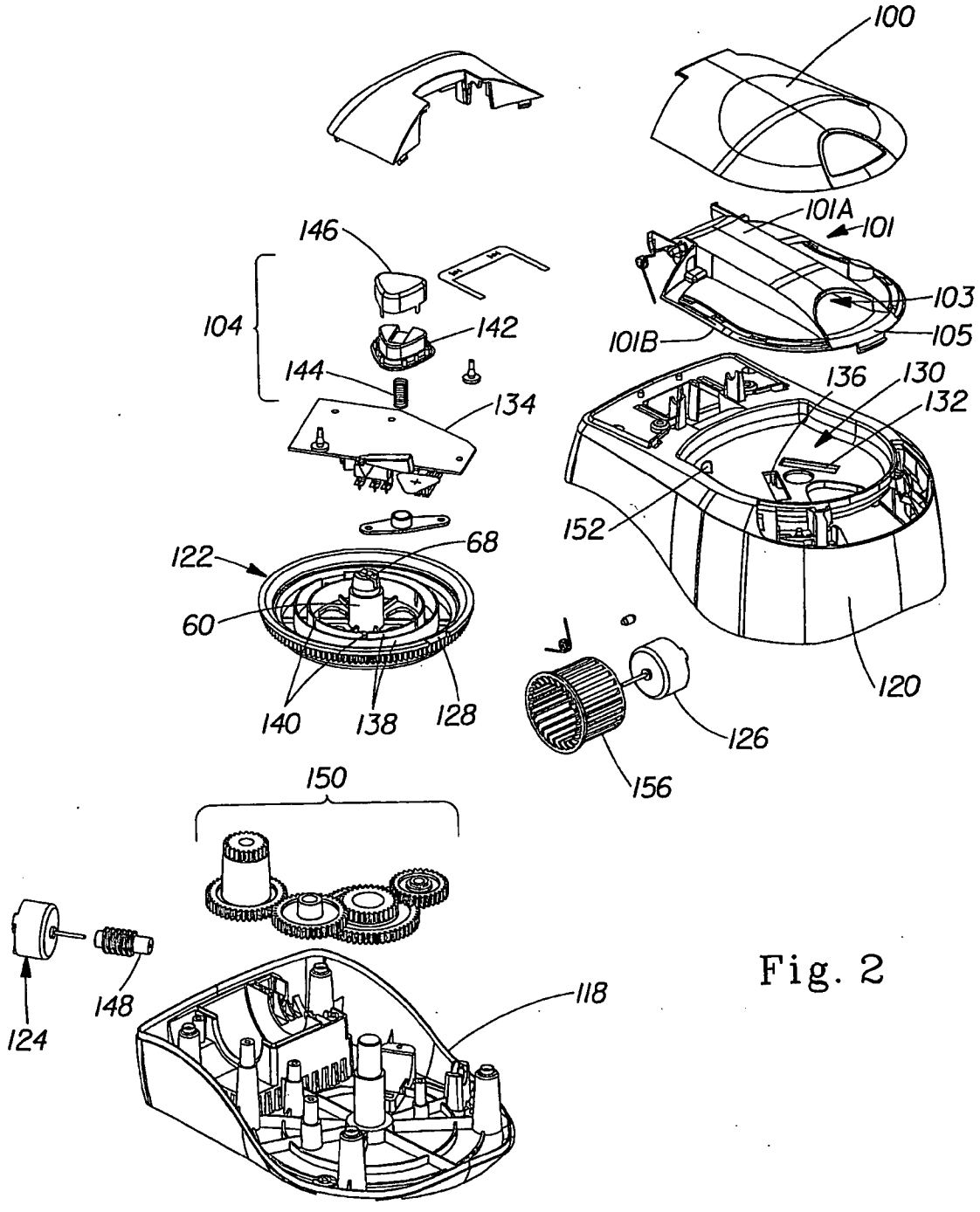

Fig. 2

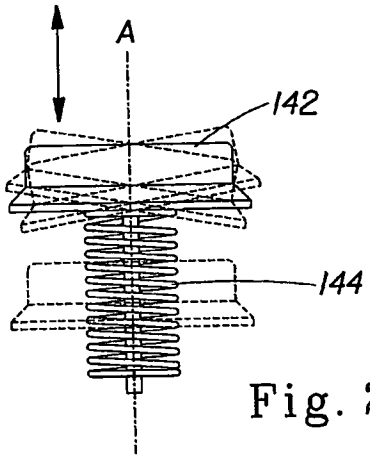

Fig. 2A

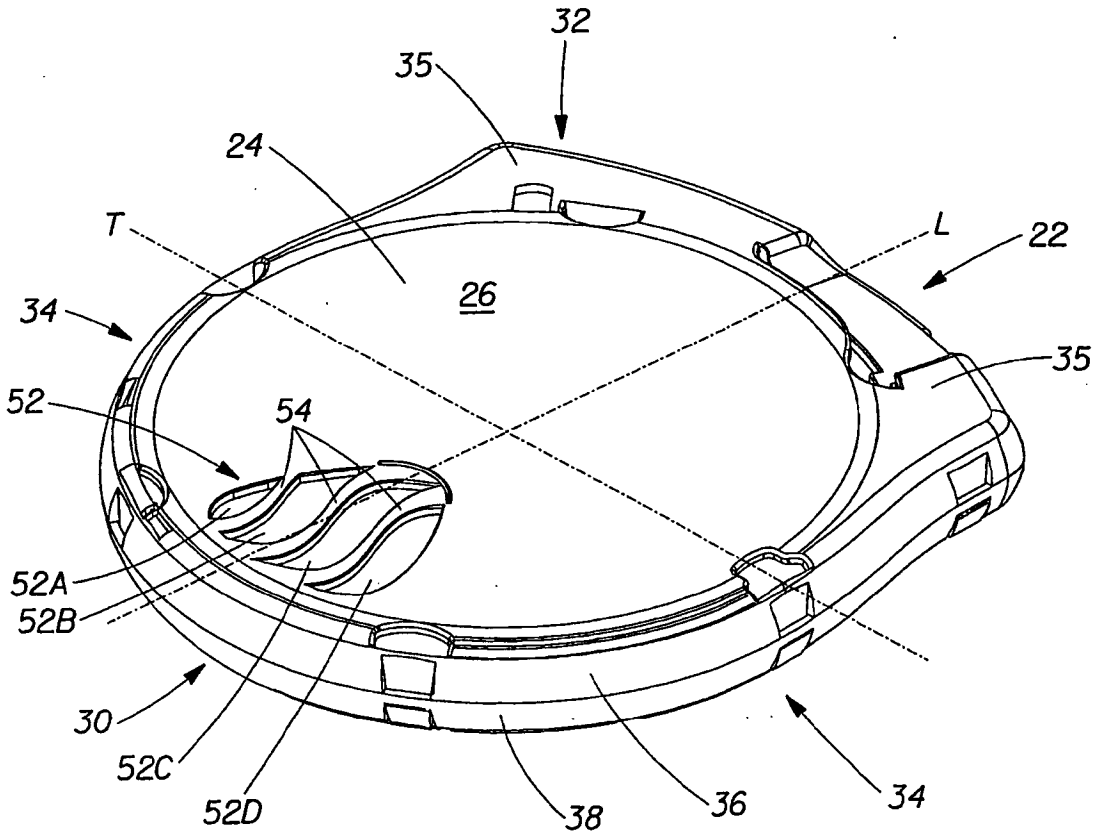

Fig. 3

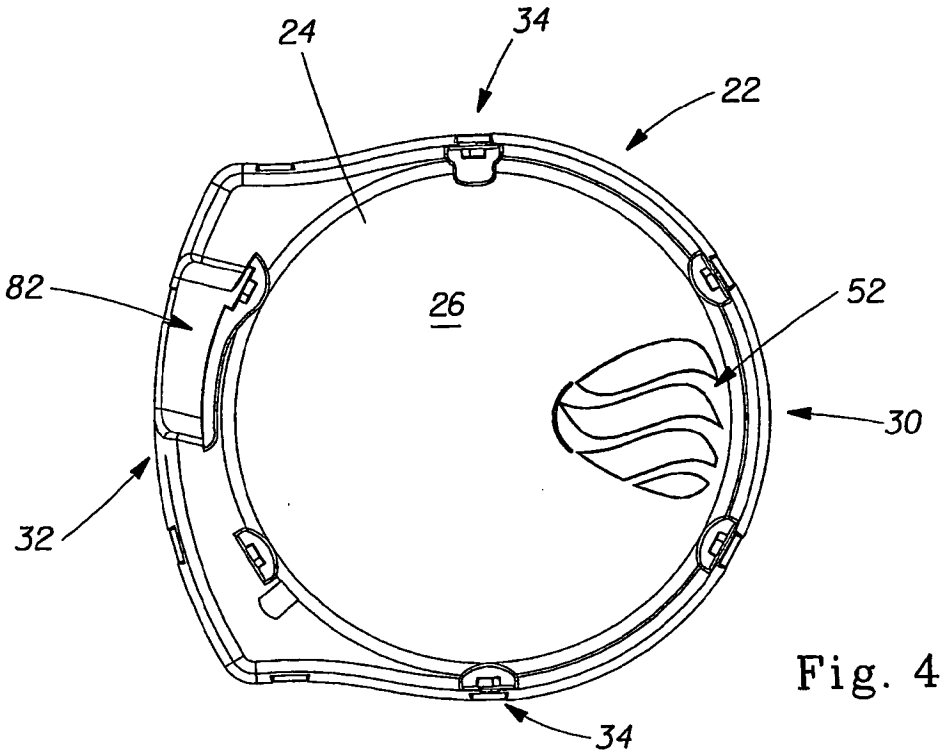

Fig. 4

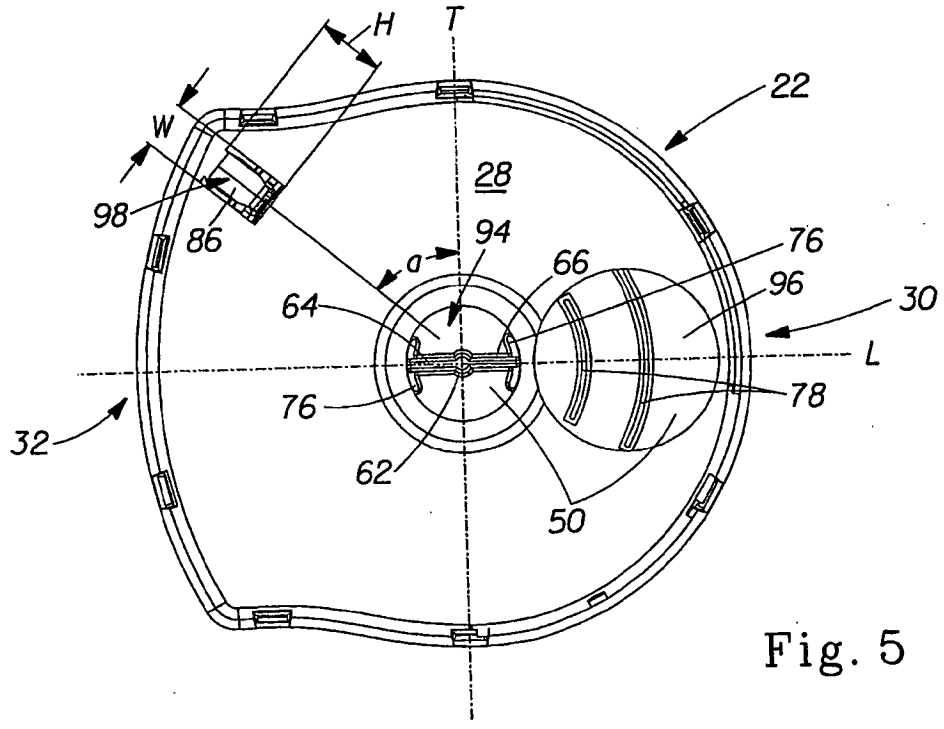

Fig. 5

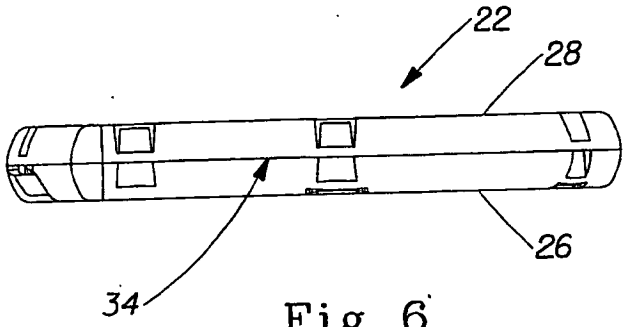

Fig. 6

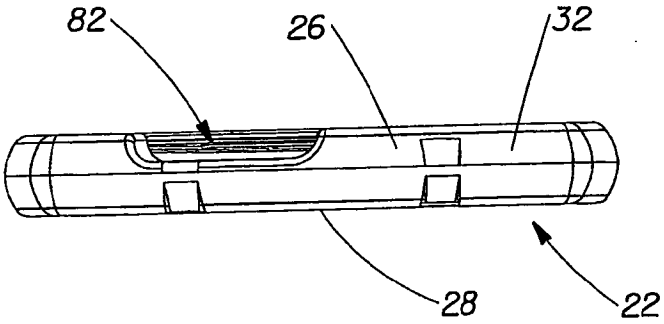

Fig. 7

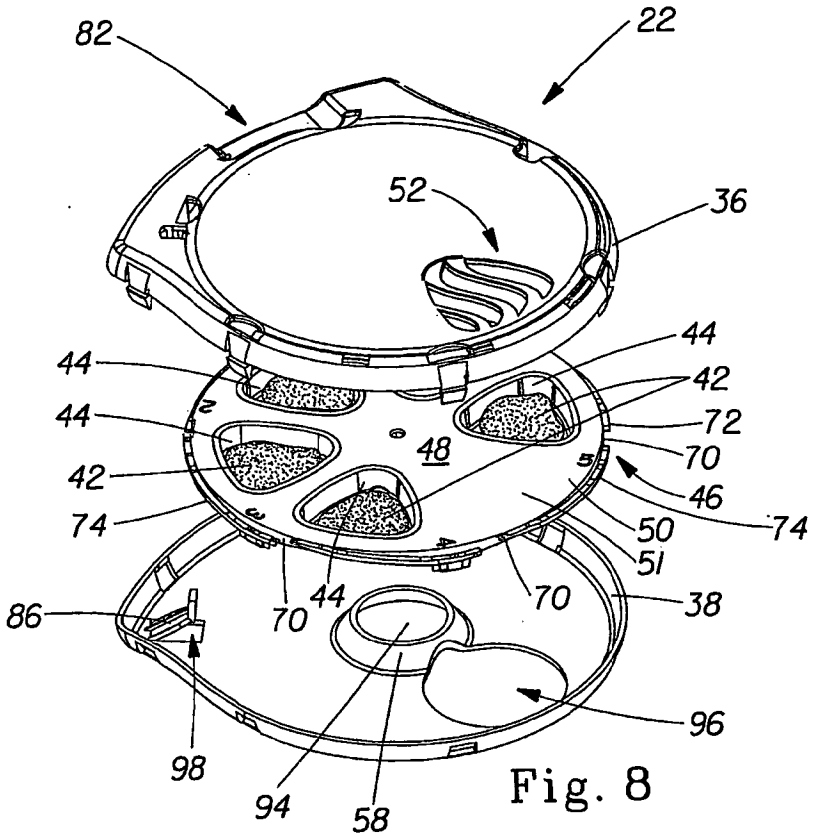

Fig. 8

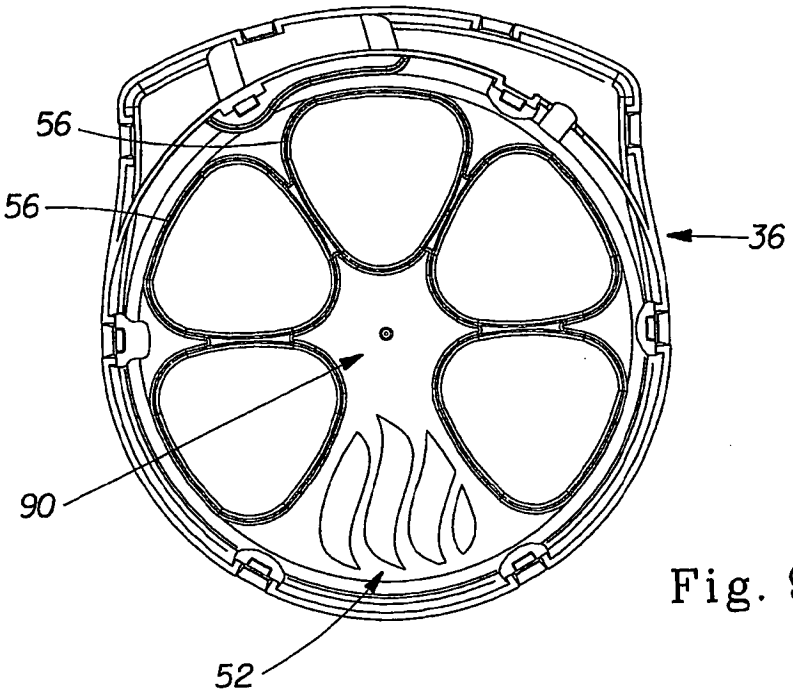

Fig. 9

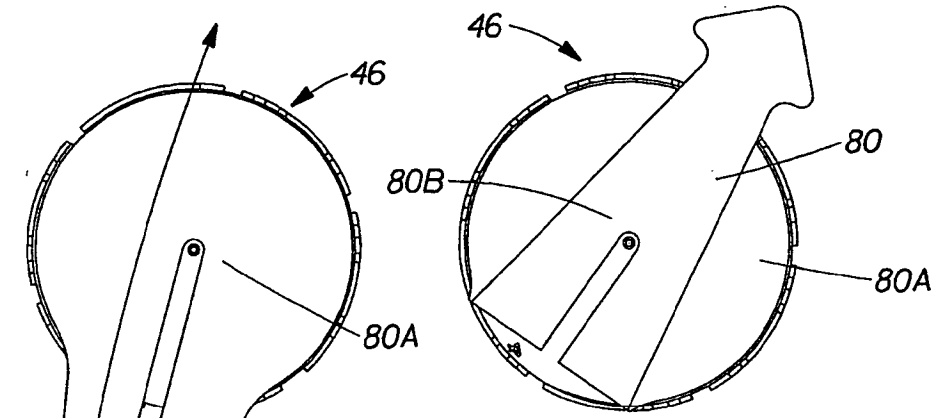

Fig. 12

Fig. 11

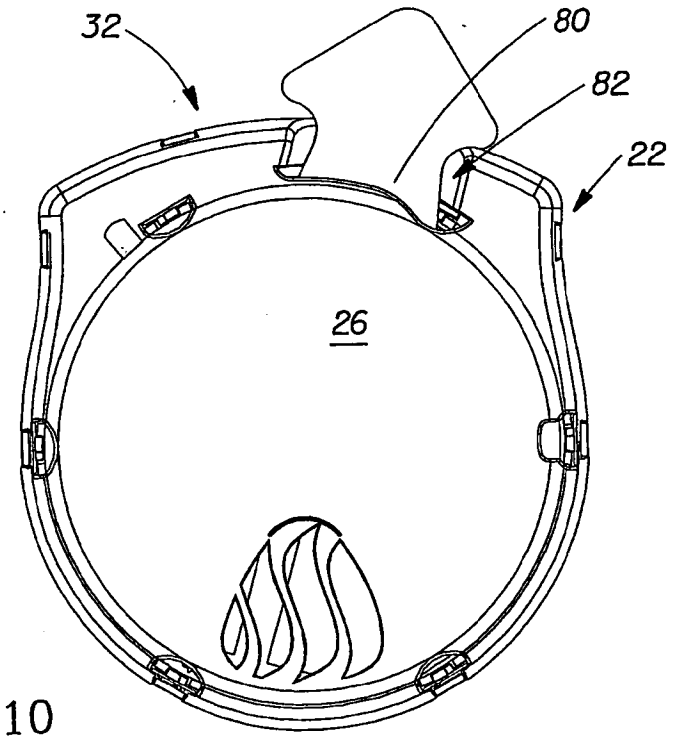

Fig. 10

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US2004/016163

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A61L9/03 A61L9/12

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A61L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, PAJ, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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"P" document published prior to the international filing date but later than the priority date claimed

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Date of the actual completion of the international search	Date of mailing of the international search report
30 September 2004	08/10/2004

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Marti, P

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INTERNATIONAL SEARCH REPORT

International Application No
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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